

Zero Retries issue 0189 2025-02-14

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fourth year of publication, with ~~2400+~~ 2500+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Web version of this issue - <https://www.zeroretries.org/p/zero-retries-0189>

Subscribe now

In this issue:

- **Request To Send**
 - 2500 Email Subscribers to Zero Retries!
 - Paid Subscribers Update
 - In the Queue for a New Hamshack Hotline Extension
 - The Ascendancy of Digital Technology in Amateur Radio
- **What's New at Digital Library of Amateur Radio & Communications — February 2025**
- **Explaining the Use Case for Data Over Repeater - Part 4**
 - QO-100 - Hemispheric SuperPeater
 - SuperPeater and IP400 Network Project - Significant, But Not Total Overlap
 - Reasons to Develop a SuperPeater Network
 - Dynamic Interoperation Between SuperPeaters
 - Advancing the State of the Art in VHF / UHF Repeaters
 - *Use* Our Amateur Radio Spectrum or *Lose* Our Amateur Radio Spectrum
 - Conclusion, and Future Rollup Article
- **ZR > BEACON**
 - Upcoming Events Countdown
 - Hamshack Hotline Needs Your Help
 - Build RADIO Networks; we TRIED (and it's time to try again)
 - AREDN Production Release 3.25.2.0
 - 44Net Email and Web Page Hosting Offered
 - Open LTE on Amateur Radio Bands?
 - Discussion About Whether Digital Voice is *Data*, or is it *Voice*?
 - ARDC and 44Net Discussed on Ham Radio Workbench Podcast
- **Comments Summary From Previous Issue**
- **Zero Retries Boilerplate**
- **Permission for Reuse of Zero Retries Content**
- **Footnotes for this Issue**
- **Comments for This Issue** (redirect to Comments page)

Request To Send

Home Posts Podcast Chat

2,500
All subscribers



2500 Email Subscribers to Zero Retries!

I'm grateful to all of you who have signed up to receive Zero Retries by email - **2500+ of you now** as of the past week. There are a few more who are "followers" on Substack, and more (no way of knowing how many) follow Zero Retries via RSS, and some followers on the two social media platforms where Zero Retries has a presence, [Mastodon](#) and [Bluesky](#).

If it weren't for all of you readers, there would be no reason to publish Zero Retries.

And again, thanks to those valiant paid subscribers, and especially the Founding Members, who help Zero Retries keep going financially.

###

Paid Subscribers Update

My thanks to **Prefers to Remain Anonymous 21** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

###

In the Queue for a New Hamshack Hotline Extension

My very earliest experiences in electronic experimentation... OK, *hacking*, was in my pre-teens goofing around with our household telephone. I'll guess that I'm one of the last generation who will ever have the pleasure of being "tingled" by Alternating Current (AC) ring voltage on a Plain Old Telephone System (POTS) line. Thus not only do I retain a fascination for analog telephony, that fascination has translated to Voice Over Internet Protocol (VOIP) telephony, especially now that the [Asterisk](#) system is so approachable, and can be run on a Raspberry Pi. I even have two Private Branch Exchange (PBX) units in my electronics archives if I have enough lifetime to experiment with them. But in the meantime...

I've noticed that a number of Amateur Radio Operators are now including their [Hamshack Hotline](#) number. It's been a while since I last tried to use Hamshack Hotline; my last use of Hamshack Hotline wasn't great because I used a flaky VOIP to POTS interface that kept resetting, and I never quite got around to replacing it with something more stable. Since I didn't use it, Hamshack Hotline deprecated that extension.

It seems like there's a fun to be had with someone listing their Hamshack Hotline number, all but inviting other Amateur Radio Operators to call and chat. I have plans to put some folks on speed dial and speakerphone during sessions at my workbench and radio desk.

My decision to re-engage with Hamshack Hotline was aided by a review and recommendation by [The Random Wire](#) Editor Tom Salzer KJ7T of the [Polycom VVX 401](#) that is fully supported by Hamshack Hotline. I jumped through the hoops required of applying for a Hamshack Hotline new line, and now I await my new extension number to be allocated:

Your ticket is in the queue.

Update: Just as I was wrapping up this issue of Zero Retries on Friday, I received an email that my request for a new Hamshack Hotline extension has been processed, but it won't be activated until tomorrow (Saturday 2025-02-15). It will undoubtedly take me some fumbling around for me to provision my shiny new Polycom VVX 401. Thus I'll mention my new Hamshack Hotline number in next week's Zero Retries.

I had a fantasy that I might be able to have several Hamshack Hotline phones on my various desks / workbenches in N8GNJ Labs and have them all ring (apparently that's called a Ring Group) but I found this mention in the FAQs:

We no longer support new Ring Groups. We will still support the existing Ring Groups for now, but even the existing Ring Groups may be dissolved at some future date.

Bummer. I can imagine how useful Ring Groups would be in clubs and other group activities. I guess that to realize my "multiple desks" fantasy I'll have to start up my own Asterisk server and learn enough to program that as my own PBX. But that's yet another project to be added to the ever-expanding project queue, but it's enough for now to get one phone operating on Hamshack Hotline.

It's cool that there's some crossover between [Hamshack Hotline](#) and [AREDN Meshphone](#). There's also connectivity between [Hamshack Hotline](#) and [AllStarLink](#). Experimenting with both of those will have to wait for some additional Amateur Time Units (ATUs) to be allocated.

##

The Ascendancy of Digital Technology in Amateur Radio

It's amusing, at least to me, to see the gnashing of teeth about the meaning of "digital" applied to various modes, such as *digital* voice, *digital* television, etc. In my opinion, and in my observations, almost all communications over radio, even Amateur Radio, will soon be digital modulation, differentiated only by which protocol bit is applied to any given transmission. That trend is clear, and irrevocable.

I think that I'm seeing this trend so early in its adoption that it's invisible to most - a crossover point that will occur very soon of the declining use of voice in Amateur Radio and the corresponding rise of data / messaging. Or, it's possible that I'm deluded in such thinking and Amateur Radio will remain an exception to the overall trends of all electronic communications transitioning from analog to digital, and voice will remain a primary communications mode in Amateur Radio until the current demographic completely ages out of Amateur Radio.

One of the reasons I've become deeply involved in the [IP400 Network Project](#) is that users and promoters of legacy modes in Amateur Radio - voice, data, television, etc. don't seem to be able to envision a future beyond their particular mode as it's currently implemented to see the bigger picture of the evolution of digital technology in Amateur Radio. In this "ignorance of the bigger picture", I'm reminded of my experience as a Network Administrator. In that era, I had to deal with numerous and completely unique network technologies - ARCNet, NetBEUI, IPX/SPX, AppleTalk, SNA, DECnet, WangNet¹, ATM, etc. (Yes, really... I had to deal with all of those to some degree.) All of those were well-designed (well, not NetBEUI), and served their respective use cases. But all of those were inevitably sunset in favor of TCP/IP because TCP/IP was flexible enough to encompass all of those use cases... and the evolving technology was able to accommodate TCP/IP.

In my vision of the ultimate evolution of IP400, it won't be the "TCP/IP" of Amateur Radio on the VHF / UHF bands (though IP400 will transport TCP/IP), it will be more akin to the *Ethernet* of Amateur Radio. As in IP400 will be a neutral transport mechanism that can be adapted to many different modes / use cases. In creating new modes / new use cases in Amateur Radio, those new modes / use cases will be created entirely in software / protocols designed to run on IP400 networks.

At the moment, in the very early stages of IP400's development, it's a lonely quest to explain and evangelize such potential. But I'm aided by encountering, decades ago, Steven Covey's principle (Habit #2) "[Begin with the end in mind](#)". Since then, when envisioning something new, that principle has been incredibly useful - imagine how you want this new thing to end up when it's fully formed. Thus long before I connected with Martin Alcock VE6VH to discuss what became the IP400 Network Project, I had a pretty clear vision of how a 21st century "data transport mode" for Amateur Radio VHF / UHF would work.

The development of IP400 is going to be really, really fun. *Not* easy. *Not* fast. *Not* rapidly adopted... at first. But *it is* going to be really, really fun for those of us who enjoy experimenting with data over radio. I've been around long enough to see... in retrospect, certain inflection points in history and technology, like the evolution of TCP/IP. From that perspective, I foresee that IP400 will be another major inflection point in Amateur Radio.

What's really cool is that IP400 could only happen in the *unique circumstances of Amateur Radio*, and it could only happen in this era, *now that all of the needed technologies are readily available*. Buckle up - it's going to be a wild ride, and you have a ringside seat as a reader of Zero Retries.

##

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

Steve N8GNJ

Leave a comment

Share

What's New at Digital Library of Amateur Radio & Communications — February 2025

By Kay Savetz K6KJN

Internet Archive's Program Manager, Special Collections

I'm grateful for the friendships I've made while curating the DLARC library. To be perfectly honest, it's been more of an emotional roller coaster than I

ever expected.

Part of my job is e-mailing or calling up old guys and asking for their material: do they still have copies of the magazine or radio show that they produced? Would they mind if I made them available to the world in a free online ham radio library? Some of the them are just the best, the nicest folks you'd ever want to talk to. They give me their permission, they send me their stuff to digitize, they chat with me about radio and the world and whatever, we keep in touch ... and then a few months later, they're on their deathbed.

More than a year ago I became friends with Hap Holly KC9RP, who was creator of [The RAIN Report](#), and more recently the [Classic RAIN Hamcast](#). Smart guy, great interviewer, just a pleasure to chat with. I realized recently that he hadn't posted a new episode of the Hamcast in a few months. I spoke with Stephanie, his wife. She told me that he is recovering from surgery for esophageal cancer, and has early stage dementia. He's at a nursing facility in Des Plaines, Illinois. Stephanie doesn't expect that he'll be returning home. She said that friends can visit, but Hap might need a reminder of who you are.

A more recent friendship I made is with Henry Ruh. He was publisher of A5, The Amateur Television Magazine. The first time I called him, he was in bed, at home, paralyzed. We talked about his history in ham radio and amateur television, about the people he knew and the technology he played with. Henry wasn't able to box up the stacks of magazines in his room, but convinced his caretaker to box up the stuff and Fedex it to me (even though that was certainly well outside her duties.) As a result, [42 issues of his trailblazing ATV magazine](#) are online for the first time. Henry was upset that the first eight years (1970 or so through 1977) were somehow lost over the years. A list of the issues we need are in the [DLARC Wantlist](#). Do you have them?)

I talked with Henry again last week to let him know his magazines had been archived. He was in the hospital, headed home soon for hospice care. Henry is funny, and seems to be handling devastating news with grace. I called him again a minute ago while writing this. His voicemail is morbidly hilarious, asking people to RSVP for his funeral. "No children will be allowed, as it will be an X-rated funeral. I will be naked...they will cremate me until my skin is nice and crispy. Enjoy eating my body."

I don't know where I'm going with this, except to say the ham radio community is great. And, I'm so glad that Hap's and Henry's work are saved for posterity in the DLARC library. And, be sure to reach out to the friends you haven't talked to in a while, because tomorrow isn't guaranteed.

Now, take a deep breath with me and I'll try to switch gears to our regularly scheduled What's New at DLARC column.

In the boxes that Henry sent me was a single issue of TV-Amateur, a publication that I was previously unaware of. TV-Amateur was the magazine-style newsletter of AGAF, the German Amateur Radio Television Association. AGAF published the quarterly magazine, dedicated to amateur radio television, long-distance television reception, satellite reception, video technology and other image and text transmission methods, from 1969 through 2019. The group disbanded then was re-established as part of Deutscher Amateur-Radio-Club (DARC). Thanks to the gracious permission of DARC, [all 193 issues of TV-Amateur](#) are now available in the DLARC library.

I've been writing about adding material from Bob Cooper's estate for months now. I'm happy to report that pretty much all of the [printed material from Coop is scanned and online now](#); there are still several boxes of videotapes waiting to be digitized.

The UK Microwave Group makes the most recent editions of its newsletter, Scatterpoint, available exclusively to members of that organization, releasing older newsletters after a couple of years. So I'm happy to say that DLARC has added the [2023 issues of Scatterpoint](#) to the collection, for a total of 213 issues going back to the newsletter's start in 1999.

DLARC hit a jackpot of newsletters related to DXing recently. We've added the entire run of [425 DX News](#), which is "The Italian Weekly Bulletin for Serious DXers." Incredibly, this newsletter has been published every Saturday since 1991, never missing a week — as a result, we have more than 1,700 issues. The first 200 issues were written entirely in Italian. It switched to English in 1995 in part due to widespread access to the global Internet.

We've added 54 issues of the [Kansas City DX Club newsletter](#), going back to 2020. The club is focused on DXing and contesting. The newsletter has been a labor of love by Mike Crabtree AB0X since 1981. Club members are on the lookout for older issues to add to the collection.

And, we've added an archive of [DX World Weekly Bulletin](#), a newsletter about DXing that has been published by Björn Dettmaring ON9CFG since 2013. We've got more than 430 issues going back to issue number one.

As usual, these are just the large swaths of things added. Interesting individual items are being added every day! [18 Callbooks](#) added to the Callbook collection. Hundreds of [business cards collected by Bob Cooper](#). [Press clippings that Henry Ruh saved](#) over the years. An incredible variety of [historical ham radio newsletters](#). Remember, you can always spy on the latest material added to DLARC [at this URL](#).

Digital Library of Amateur Radio & Communications is funded by a grant from Amateur Radio Digital Communications ([ARDC](#)) to create a free digital library for the radio community, researchers, educators, and students. If you have questions about the project or material to contribute, contact me at kay@archive.org.

#

Editor's Note: I don't think it's overstepping bounds to mention that Kay and I have become friends, and occasional collaborators in expanding DLARC's content. Beyond my individual contributions to DLARC, I've passed along interesting possibilities of potential material for DLARC to Kay.

I really don't think it's overstating the case that if Kay, on behalf of DLARC, had not offered, in time, to facilitate the donation of unique material, such as Henry Ruh's archives, Hap Holly's archives, and Bob Cooper's archives, that material would have nowhere to go...but the recycling bin. As painful as such situations are to those of us wanting to preserve some of the history of Amateur Radio...it's completely understandable because those that are left behind to deal with the estates of Amateur Radio Operators simply don't have any idea what to do with archival material. The radios - those can pretty easily find homes. But file cabinets and bookcases and boxes of material...those are much harder to find homes for.

The takeaway here is to let Kay at DLARC know about potentially interesting collections of media relating to Amateur Radio. **You might be the only one** (that knows about DLARC) standing between such material being shared with the world...or oblivion in a recycling bin.

Leave a comment

Share

By Steve Stroh N8GNJ

Conclusion of a series:

Zero Retries 0179 - Explaining the Use Case for Data Over Repeater - Part 1

Zero Retries 0181 - Explaining the Use Case for Data Over Repeater - Part 2

Zero Retries 0182 - Explaining the Use Case for Data Over Repeater - Part 3
(SuperPeater Introduction)

Zero Retries 0188 - Explaining the Use Case for Data Over Repeater - Part 4
(SuperPeater, Continued)

QO-100 - Hemispheric SuperPeater

I woke up one morning in the past week with the inspiration that I can explain the use case of a SuperPeater (to some degree) by discussing QO-100, the satellite payload for Amateur Radio on a satellite 36,000 km above Africa (Geostationary) as the ultimate SuperPeater. AMSAT-UK's excellent web page [Es'hail 2 / QO-100](#):

The geostationary satellite Es'hail-2 carrying [amateur radio transponders](#) launched from Kennedy Space Center at 20:46 GMT on Thursday, November 15, 2018 and is now in a geostationary orbit at 25.9° East. These are the first amateur radio transponders to be put into geostationary orbit and they are expected to link radio amateurs from Brazil to Thailand.

Es'hail-2 carries two "Phase 4" [amateur radio transponders](#) operating in the 2400 MHz and 10450 MHz bands. A 250 kHz bandwidth linear transponder intended for conventional analogue operations and an 8 MHz bandwidth transponder for experimental digital modulation schemes and DVB amateur television.

Narrowband Linear transponder
2400.050 - 2400.300 MHz Uplink
10489.550 - 10489.800 MHz Downlink

Wideband digital transponder
2401.500 - 2409.500 MHz Uplink
10491.000 - 10499.000 MHz Downlink

However it was accomplished (I've heard varying stories), QO-100 is a *fantastic* achievement within Amateur Radio. I wish, fervently, that a similar Amateur Radio payload could provide equivalent service for the Western Hemisphere... but that's another discussion for another issue.

While the technology of my imagined SuperPeater is different from QO-100, the idea, broadly, is very similar. QO-100 operates as a centralized node, from a high vantage point. This *enables widely separated Amateur Radio Operators to communicate amongst themselves, using varying modes, with modest stations*.

The primary conceptual difference is that QO-100 is a single node at a high vantage point, and SuperPeaters are at not-quite-so-high vantage points. SuperPeaters are nodes in a network, accomplishing the same broad idea of...

[enabling] widely separated Amateur Radio Operators to communicate amongst themselves, using varying modes, with modest stations.

In a SuperPeater network, when you connect to one repeater, you don't have to "stay" on that repeater if you want to communicate with someone who is on a different repeater. In my SuperPeater concept, your connect request "passes you through" into the network to a different repeater to reach your intended other user (or resource).

This is similar to what we do now with "radio hotspots" that use Internet connectivity. The big difference is that a SuperPeater accomplishes this same functionality with a user radio connecting to a wide area repeater *over radio* rather than a personal node connected by Internet.

SuperPeater and IP400 Network Project - Significant, But Not Total Overlap

In between Part 3 of this series and this concluding article... the [IP400 Network Project](#) emerged. While the IP400 Network Project has a lot of overlap with the SuperPeater concept as I have imagined and described it here in Zero Retries, SuperPeater and IP400 *are not equivalent*.

One reason is that my SuperPeater concepts are just that - *concepts*. While it's been revealed that the development roadmap of the IP400 Network Project will develop an IP400 adapter to upgrade Amateur Radio VHF / UHF voice repeaters to interoperate with IP400 user radios, such a unit is not yet being discussed publicly.

Thus, some of the technology that I'm imagining / hoping for in a SuperPeater may not be a part of IP400, initially or at all. While I think my ideas about a SuperPeater(s) have merit, I don't have the skills to realize such ideas. So... I will describe my SuperPeater ideas, and we'll see what happens.

However, there is 100% overlap between a SuperPeater and IP400 in the IP400 user radios. While a SuperPeater could interoperate with older digital voice and data radios and systems, I saw no realistic prospect for an advanced user data radio that could take full advantage of a fully realized SuperPeater... until Martin Alcock VE6VH created the IP400 user radio that was pretty much what I was imagining for an advanced user radio as part of a SuperPeater system.

Reasons to Develop a SuperPeater Network

Coverage

The network of VHF / UHF repeaters that Amateur Radio operators and clubs have deployed over the past 50+ years is one of the most remarkable aspects of Amateur Radio. The sheer ubiquity of repeater coverage over the continental US, for example, is amazing. I'm working on another project where a co-conspirator created a map overlay of (very conservative) coverage of the Amateur Radio VHF / UHF repeaters in Western Washington, and the only areas that didn't have overlapping repeater coverage were the national forests and the Cascade Mountains.

But generally Amateur Radio VHF / UHF repeaters in this era are standalone systems, or "lightly integrated". A typical example is a network of linked repeaters that are connected to function as a single repeater, with multiple input and output frequencies depending on location. A transmission on any

linked repeater is repeated by all of the linked repeaters.

Ease of Communications

One of the primary reasons to use a VHF / UHF repeater is ease of communication compared to using simplex mode on VHF / UHF. The IP400 Network Project will implement peer-to-peer dynamic mesh networking, but there are many situations where operating through a repeater is far preferable than mesh networking. One example is a short communication to another station within coverage of a common repeater; if the repeater is otherwise idle, it's more efficient to use the repeater than relaying through a series of mesh nodes.

Repeaters provide solid communications over a wide area for modest Amateur Radio stations. An outdoor antenna driven by a radio with at least modest transmit power (10 or 25 watts) provides adequate signal into a repeater for reliable, pleasant, efficient communications.

This applies to data as well as voice. If Amateur Radio wants to attract new people into Amateur Radio, being able to use repeaters for data as well as voice is a strong attractant.

Community (Water Cooler)

We humans gravitate to gathering places - water holes, taverns, and in offices, water coolers or equivalent. Scheduled nets, calling frequencies, and repeaters are such gathering places in Amateur Radio.

Our experience with the Puget Sound Amateur Radio TCP/IP Network was that the (then) 9600 bps Frequency Shift Keying modems and radios were "fussy" to the point that the most effective way to communicate was via dedicated repeaters that incorporated bit regeneration. The "bit regen" circuit "cleaned up" the incoming signal and it was easier for everyone involved to adjust their radio for working optimally with the repeater than the many varying user radios.

But there was also the social aspect - the repeater was where everyone "hung out" in the evenings, and it was fun to "watch the traffic" to see what folks were up to. We had the ability to do random chats between each other, and small groups, using UI (Unnumbered Information) transmissions.

Dynamic Interoperation Between SuperPeaters

What if...

- A user can hear one repeater well (for example on 420-450 MHz) but cannot transmit to that repeater reliably (their location is slightly shadowed from the repeater).
- That user can transmit to another repeater very well (a repeater on 222-225 MHz)
- The two repeaters have a high speed data communications link between them, and the 222-225 MHz repeater can "accept" transmissions for the 420-450 MHz repeater and transmit the user's transmission to the 420-450 MHz repeater in real time, and the 420-450 MHz repeater retransmits that user's transmission as if it had been received directly on the 420-450 MHz repeater's native input?

We kind of do that now, but with dedicated remote receivers for each repeater. With advanced data communications (and very smart "switching"), we could do the same thing with multiple repeaters. For voice operation, just transmit with a different CTCSS (or digital equivalent) for the desired repeater.

Advancing the State of the Art in VHF / UHF Repeaters

Amateur Radio has incredible flexibility in the ability to do unconventional things with VHF / UHF repeaters. Amateur Radio used to be limited to "convention" because Amateur Radio VHF / UHF repeaters were primarily surplus units retired from commercial and public safety use. That was the default... but those old systems don't have to define how Amateur Radio VHF / UHF repeaters operate in the 2020s. For example:

- Use of multiple bands - Receive on one band, transmit on another. If conventional repeater placement isn't possible (on a building rooftop, with expensive rent, and expensive equipment required such as duplexer and bandpass cavity, then a pair of radios operating on different bands can be made to work as a repeater.
- Narrow or wide channels - Uniform, narrow channels is a convention that we've chosen to implement on VHF / UHF because of the technology of repeaters from 50+ years ago. That convention should not constrain us from experimenting with different bandwidths, etc. in the 2020s.
- Changing technologies - In comparison to commercial or first responder "massive fleets of radios requires uniformity", Amateur Radio's much lower user base means that technologies can be changed. In a lot of ways, dedicated repeaters for different modes was "doing it the hard way" and the price to be paid for "fracturing" the Amateur Radio repeater user base into various "tribes" was dramatically lower usage of repeaters overall.
- Real Single Channel Repeaters Using TDMA - Hytera offered an interesting variation on Digital Mobile Radio (DMR) in some of its portable DMR repeaters. Instead of using the two DMR time slots on a repeater for two independent receive / transmit paths, it modified the DMR protocol so that on a single channel, one time slot was receive, and one time slot was transmit. The result was a "full duplex" (Time Division Multiple Access) repeater that used only a single channel. With the various software implementations of DMR, it should be possible to recreate this technique for use in Amateur Radio. Imagine no need for transmit / receive separation duplexers.
- Integrated Repeater Near the Antenna - The [Remote Radio Unit \(RRU\)](#) was developed as part of the M17 Project. Generally, a RRU integrates all of the radio systems of a repeater in a small weatherproof unit that can be installed in close proximity to the repeater antenna. This minimizes feedline loss (and the expense of high quality feedline), and only power and data cabling to an indoor unit are needed. I envision that an RRU repeater would be particularly applicable to "walk up" repeater sites such as building rooftops where "radio room" space for duplexers, power supplies, etc. is at a premium.

Use Our Amateur Radio Spectrum or Lose Our Amateur Radio Spectrum

This is an old bogeyman argument that many don't take seriously. "As long as they don't touch (insert favorite band / mode), I don't care".

The increasing *lack* of use of Amateur Radio repeaters is noticeable within Amateur Radio. But more worrying is that in the era of widely accessible

Software Defined Receivers which can display the usage (or lack of usage) of an entire VHF / UHF band on a single display... others can notice such lack of use and document that definitively. Previously, "documentation" of lack of usage was largely anecdotal reporting.

I posit that there's greater harm in lack of use of repeaters than the disruption of converting a repeater to allow use of additional modes such as data. This especially applies to repeaters in lesser used bands such as 50-54 MHz (6 meters), 222-225 MHz (1.25 meters), 902-928 MHz (33 centimeters), and 1240-1300 MHz (23 centimeters).

Conclusion, and Future Rollup Article

This series of articles became a bit of a sprawling, disjointed treatment of the concept of the use of data over (currently) voice repeaters, my concept of a SuperPeater, and the sudden introduction of the IP400 Networking Project. The four articles were developed asynchronously from each other, rather than written as a single article, published in four installments.

I plan to consolidate and rationalize the four articles in this series into a single article about my core concepts of a SuperPeater. In that discussion, I will incorporate the "mid 2025" best guess of the capabilities of an IP400 user radio, and perhaps (if some hoped-for development occurs), discussion of the IP400 repeater unit.

Leave a comment

Share

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

Upcoming Events Countdown

- [Utah Digital Communications Conference](#), 2025-02-22 in Sandy, Utah, USA in **1 week**.
- [HamSCI 2025](#), 2025-03-14 and 15 in Newark, New Jersey, USA in **5 weeks**. Tina KD7WSF and I will attend this event. I hope to meet up with any Zero Retries readers that are also attending HamSCI 2025 to talk about all things Zero Retries Interesting.
- [Southeastern VHF Conference 2025](#), 2025-04 and 05 in Clarksville, Tennessee, USA in 7 weeks. [More details in an email list message.](#)
- [LinuxFest Northwest 2025](#), 2025-04-25 thru 27 in Bellingham, Washington, USA in 10 weeks. The largest Linux conference in the Pacific Northwest. No direct involvement with Amateur Radio, but I'll be attending and learning.
- [Four Days In May 2025](#) - 2025-05-15 in Fairborn, Ohio USA (in conjunction with Hamvention 2025) in 14 weeks. *The biggest and best QRP (low power operation) event in the world!*
- [Hamvention 2025](#) - 2025-05-16 thru 18 in Xenia, Ohio, USA in 14 weeks. I will be attending this event. I hope to meet up with any Zero Retries readers that are also attending Hamvention 2025 to talk about all things Zero Retries Interesting.

###

[Hamshack Hotline Needs Your Help](#)

Posted on the Hamshack Hotline website 2024-12-04:

Our helpdesk is temporarily closed while we work on some improvements to internal processes.

For answers to common questions, please visit our Wiki page at:

<https://wiki.hamshackhotline.com>

You might also be able to connect with others on our Discord server where "Wisdom of the Crowd" is an awesome thing !

We currently have a dire need in the following areas:

1. License validation/compliance department (our largest area of need right now)
2. Line provisioning and helpdesk support
3. Asterisk engineering

If you would like to help out in any of these areas, please let us know in the #recruiting channel on our discord, or contact K1WIZ to setup an interview (email good on QRZ). It is only because of the work of volunteers that Hamshack Hotline is made possible.

I saw this article while getting ready to apply for a new HH extension. With my *ample spare time* in between Zero Retries work 😊 I might be tempted to see what I can offer with a few hours per week, but (*Catch 22!*) at the moment, I have no idea what the user experience is for Hamshack Hotline.

###

[Build RADIO Networks; we TRIED \(and it's time to try again\)](#)

My posting on the 44Net email list on 2024-01-15, and it seems worth mentioning it here in Zero Retries.

In my opinion, there were legitimate reasons for packet radio networks stagnating and eventually taken offline besides “hams are cheap, so we used the Internet”.

Truth be told, Amateur Radio never quite got its entire act together in building extended networks, especially in VHF / UHF, mostly because higher speed data radios are hard and expensive. One of the most successful, which I recently wrote a little bit about, was TexNet which used surplus RCA radios and custom-built and custom-programmed node controllers.

We had some valiant attempts of reasonably high speeds such as the WA4DSY 56k radio modem (required an expensive transverter), Icom Digital Data D-Star (only on 1240 - 1300 MHz, 10 watts, required a \$600 ID-1 back in the day), TAPR FHSS Radio (designed and parts were obsoleted before design could be completed, twice), NWDR UDRX-440 (didn't make it out of development), etc.

For every ham that had the ability to mod a converted commercial radio to bypass the pre-emphasis / de-emphasis stages, there were 10 who didn't have that skill. There were, briefly, some radios that came with the “data / 9600” jack, but they were expensive to devote to “just data radio” use.

Even 9600 bps FSK was fraught with peril and unless you used the same radios to communicate (like the Kenwood TM-D710 series), 9600 just didn't work all that well.

That said, there are some networks struggling to expand (NCNet) and rebuild (Eastnet) and others.

But now, we have the tech to fix all of those issues.

- Raspberry Pis and other cheap embedded computers that make better nodes than any TNC (or proposed NNC) ever could
- We now have two Forward Error Correction systems available for packet - FX.25 and IL2P
- DIRE WOLF Software TNC drastically increased the usability of packet radio with its bit flipping technique, and added both FX.25 as options.
- The NinoTNC offers a number of speed tiers and optional IL2P
- We routinely run the protocol and network stacks outside the “modem” (TNC) in a powerful host computer.
- We can do highly reliable data communications on VHF / UHF. Look to VARA FM as an example of how much can be done. Yes, you have to pay a fee, it's Windows only, it's proprietary... but it works and does 25 kbps in a typical VHF / UHF channel.
- Similarly, if you want to build up networks on HF, VARA HF has similar reliability (with the same downsides).

In Friday's (2025-01-17) issue of Zero Retries (Zero Retries 0185), there will be an unveiling of a proposed system to tackle the “lets build RADIO networks” issue - <https://www.zeroretires.org/p/zero-retries-0185> (publishes at 15:30 Pacific).

My posting got a mild, agreeable response on the list, but no real uptake (that I noted).

That trailing “teaser” was the beginning of discussing the [IP400 Network Project](#) which I think will be the ideal “bridge” radio technology between legacy Amateur Radio Packet Radio on VHF / UHF bands and AREDN Mesh operating on 2.x and 5.x microwave bands. Speaking of AREDN...

###

[AREDN Production Release 3.25.2.0](#)

From the AREDN website:

AREDN Production Release 3.25.2.0 is now available for download. Here's an overview of the fixes and enhancements in this release. All of these changes have been thoroughly tested through via the nightly builds and our intrepid band of testers!

Features

- New Mobile UI
- Ability to backup and restore node configurations
- Responsive design for desktop UI on smaller screens
- Improved logged-out experience to provide more information
- Improved WiFi Signal tool which shows SNR at both ends of link
- Added support for ARDC's 44-Net
- Upgraded to the latest OpenWRT release: 24.10

Notes

- By default LAN devices are no longer permitted to access the Internet over the mesh. This can be re-enabled if required.
- The old UI is no longer available.
- We recommend the High Contrast theme when using the mobile UI outside.

- The new WiFi Signal tool requires both ends of a link be running the latest firmware.
- Any node running MeshChat will need to upgrade to [MeshChat 2.13 from this repo](#) after upgrading the node firmware to 3.25.2.0

Enhancements

- Added more USB controller modules [#1878](#)
- Added usbutils loadable package [#1875](#)
- Improved firewalling of LAN [#1862](#)
- Made further improvements to LAN to WAN firewalling. [#1863](#)
- Enabled 44NET LAN configurations [#1548](#)
- Enabled kmod-EEPROM-at24 package [#1529](#)
- Made watchdog improvements [#1322](#)
- Report IP Address at the end of command line setup. [#1861](#)
- Now allow local NTP server to run as a service for LAN devices [#1865](#)
- Now allow ping and traceroute to auto select the best interface [#1856](#)
- Animated the commit message like the scan message [#1839](#)
- Added rpcapd loadable package to aid remote node monitoring [#1838](#)
- Added disconnect reporting [#1831](#)
- Throttle dnsmasq restarts when names change [#1826](#)
- Improved messaging in various parts of the network setup [#1817](#)
- Attempt to guess PC hardware and better support unknown hardware (for VMs). [#1816](#)
- Include main IP address in HNA4 records [#1814](#)
- Dnsmasq performance improvements. [#1813](#)
- QEMU User Agent available as a module for x86 build [#1798](#)
- Improved mesh device and service counts [#1796](#)
- Moved the LAN DHCP enable/disable option into the LAN DHCP panel [#1788](#)
- Improved tunnel "email" messaging [#1773](#)
- Support forcing DHCP options without a specific tag [#1769](#)
- Open a new tab for help and website menu links [#1760](#)
- Improvements to the wifi watchdog [#1757](#)
- Added a basic syslog tool [#1744](#)
- Supernodes now support 44net by default [#1753](#)
- Now provide 44net route override [#1703](#)
- Added rapid-commit (dhcp) option [#1733](#)
- Added command line tool to generate support data [#1695](#)
- Added command line backup util [#1729](#)
- Sped up commits [#1721](#)
- Added DHCP option validation [#1718](#)
- Now support DHCP options without values [#1735](#)
- Gave high contrast theme wider dialogs (now we support that) [#1716](#)
- Now support non-admin neighbor info in mobile view. [#1714](#)
- Improved help for mobile wifi signal tool. [#1693](#)
- Improved display of blocked neighbors [#1709](#)

- Provide proxy and redirect for problematic services [#1699](#)
- Now allow scanning of non-mesh and multiple wifi devices [#1578](#)
- Made tunnel server name optional if you have no server tunnels [#1688](#)
- Now support pasting lat,lon coordinates into either lat or lon map field [#1687](#)
- Now support Y.X style radio heights [#1673](#)
- Now filter the LAN name from node hosts [#1669](#)
- Added pseudo services for Local Devices [#1665](#)
- Now allow packages to be removed on low memory nodes. [#1684](#)
- Improved detection and display of services and devices [#1683](#)
- Improved which local devices and service we show when logged out or logged in. [#1682](#)
- Provide UI for the wifi watchdog system. [#1655](#)
- Improved tunnel messaging [#1648](#)
- Added topology info to sysinfo.json [#1637](#)
- Improved startup of LQM so we get some information early [#1632](#)
- Support wider channels (experimental) [#1631](#) [#1635](#)
- Split the Wifi Signal gauge to show the local and remote signal information [#1602](#) [#1628](#)
- Improved detection of disconnected nodes [#1617](#)
- Periodically sync time if continuous NTPD is unsynchronized [#1611](#)
- Now include cookies when testing services. [#1600](#)
- Improved antenna settings messaging [#1605](#)
- Added VHT support (experimental) [#1630](#)
- Decimate the neighbor graph data so we can show more history [#1598](#)
- Added capability to backup and restore node configurations [#1597](#)
- Added secondary NTP server option [#1583](#)

New Device Support

- TP-Link CPE710v2 [#1823](#)
- Mikrotik NetMetal 5
- Tupavco antenna [#1646](#)
- Ubiquiti Litebeam M5

Fixes

- Fix tx/rx bitrate reporting which was 1/2 what it should be. [#1882](#)
- Improve api performance when reading radio info. [#1881](#)
- Added fix to br-nomesh which can be created in a partially working state [#1844](#)
- We no longer allow access to port 9090 from the mesh. (It crashes OLSRD) [#1879](#)
- Added lockdown and monitor for OLSR [#1852](#)
- Reapplied older patch for Rocket 5AC Lite [#1872](#)
- Improved setup migrations [#1834](#)
- Restart LQM when tunnel configuration changes. [#1832](#)
- Don't display supernode route count (supernodes don't calculate this) [#1825](#)
- Increased dnsmasq cache sizes for supernodes to avoid memory corruption [#1811](#)
- Bumped restart timeouts so dnsmasq will respawn if it crashes. [#1810](#)

- Fixed corner case when setting up node's initial Addresses [#1804](#)
- Fixed display problem when arp contains bad entries [#1802](#)
- Fixed resource caching in browser memory [#1795](#)
- Don't refocus the mesh page when we refresh so page doesn't jump to the top [#1794](#)
- Fixed layout of LAN type so it looks the same on all browsers [#1866](#)
- Made sure we hide any overflowed nav controls [#1780](#)
- Fixed port forward layout [#1775](#)
- Now force wifi lan/wan password to be at least 8 characters [#1767](#)
- Fixed the source Addresses for pings and traces [#1765](#)
- Fixed port forward wrapping [#1758](#)
- Fixed an unresponsiveness when network changes [#1740](#)
- Made 3 column layout responsive if browser is narrow [#1741](#)
- Made more fixes and improvements to DHCP option validation [#1736](#)
- Fixed creating new first reservation [#1734](#)
- Fixed DHCP option input field number styling [#1731](#)
- Made fixes and tweaks for DHCP option in-browser validation [#1730](#)
- Fixed the assumption that the DHCP range always starts at an offset of 2. [#1726](#)
- Added localnode back into port forwarding UI [#1706](#)
- Made various bug fixes for alt networks and larger dhcp ranges [#1652](#)
- Made fixes for blank variables breaking upgrades [#1654](#)
- Fixed DMZ DHCP values [#1664](#)
- Fixed migration of services on nodes without any services [#1660](#)
- Now allow ":" in service names [#1638](#)
- Fixed firewall restart when lan-to-wan changed [#1606](#)
- Now redirect localnode to actual hostname (better logged-in behavior) [#1599](#)
- Only show TODOs to admin [#1595](#)
- Mark devices supported in previous releases, but not in the current one. [#1748](#)
- Refine PUT/POST locking. [#1742](#)
- Tweak node detection keepalive [#1713](#)
- Refine htmx activation mechanism [#1712](#)
- Make sure we don't lose the compat_version [#1697](#)
- Supported Devices List Edits (UBNT 5AC)-Issue #1674 [#1675](#)
- Remove setting old dmz value [#1657](#)
- Mark bandwidths invalid on various devices (rather than marking what is valid) [#1639](#)
- Make sure to silence the wifi signal on the way out [#1623](#)
- Work around HTMX bug where downloading files doesn't stop the logo spinning [#1622](#)
- Remove special casing for /a/authenticate page [#1619](#)
- Fix missing validation for single hx-put input fields [#1618](#)
- Block PUT, POST, DELETE unless logged in or firstboot. [#1582](#)
- Added user agents (containing firmware version info) to package and firmware updates [#1593](#)

Known issues

- 5 MHz bandwidths are not supported on any 802.11ac devices

Wow - what a blockbuster release just from the *number* of new features and fixes! I was going to excerpt a few “most notable” items, but what should I not mention? Two subtle new features that I think are notable is the optimization for “Mobile User Interface” and defaulting Internet access by devices on the LAN to “off”.

So many times, you’re setting up or troubleshooting a device and the only device you have is your mobile phone, and the user interface (intended for laptop or desktop) is terrible on a mobile phone. Thus, a responsive (adaptable) user interface is so incredibly useful.

And, while it’s tempting to use AREDN for Internet access... defaulting that setting to OFF is a useful reminder that AREDN isn’t intended for such use. Amateur Radio is not a replacement for Internet access... except when it really needs to be, and that setting can be toggled back ON for such situations.

Kudos to the AREDN team for making microwave networking in Amateur Radio more capable, approachable, and *usable* for average Amateur Radio Operators and organizations.

###

44Net Email and Web Page Hosting Offered

Mason Turner AF4MT on the 44Net email list:

[44 NET EMAIL](#)

Hello fellow 44 net users,

The 44net.email service is fully operational at <https://44.32.132.10>. The PTR records are active as well as DKIM and SPF. Please let me know if anyone has any delivery issues.

This service is operated personally by AF4MT and please do not use this email service for any sensitive or critical communications.

Any and all feedback is welcomed.

and...

[44NET WEB HOSTING](#)

I would like to reach out to fellow operators to see if there is any interest in website hosting. I can host ASP, PHP HTML etc. with no cost.

But since I will manually have to manage the host files, they will need to be within 2GB and no commercial websites will be hosted. The hostfile update window is 7 days to give me time to attend to updates as I do this on my free time. **Club websites that wish to be hosted are only permitted to process payments for membership dues and/or donations.

I gotta get off my butt and get a router set up for my 44Net allocations and get a basic web server with some interesting stuff... and access to N8GNJ Labs on my 44Net IP addresses. In this era of Starlink and Gmail and Cloudflare and other other *megascale* Internet systems... there’s still a thrill in being able to experiment with my fellow Amateur Radio Operators on the Internet and hosting my own, simple web server (probably on a Raspberry Pi 400) solely for the pleasure of doing it and experimenting with it.

###

[Open LTE on Amateur Radio Bands?](#)

Mason Turner AF4MT on the 44Net email list:

I am looking to see if anyone here has used open-sourced LTE to create a network using Amateur bands? Even a home lab. I am just looking for anyone that has experience or an interest in this.

AF4MT is *industrious* and with [lots of Zero Retries Interesting projects in progress!](#)

###

[Discussion About Whether Digital Voice is Data, or is it Voice?](#)

The link is to a wide ranging discussion on the FreeDV email list about whether FreeDV activity should be operated in the “data” portions of some HF bands, or whether it should be operated in the “voice” portions of some HF bands.

There are a wide range of opinions expressed in this thread, but the big picture is that the US Amateur Radio regulations are proving to be woefully antiquated compared to the everyday reality that all radio technologies *of the 21st century* are all “digital / data”. This trend isn’t the wave of the future, it’s the *wave of the present*.

###

[ARDC and 44Net Discussed on Ham Radio Workbench Podcast](#)

The Ham Radio Workbench crew departs from their usual format (no initial discussion of “What’s on your workbench?”) to interview three staff members of [Amateur Radio Digital Communications](#) - Executive Director / CEO Rosy Schechter KJ7RYV, 44Net Program Manager John Burwell K15QKX, and Communications Manager Rebecca Key KO4KVG. I’ve only listened to the first 30 minutes of this 2.5 hour podcast, but listening to the whole interview is queued up for my weekend activities in N8GNJ Labs.

Leave a comment

Comments Summary From Previous Issue

Comments from Zero Retires 0188:

- A bit of gloating from my co-conspirator on the IP400 Network Project about Canada's lack of symbol rates and bandwidth limits on their 430-450 MHz band.
- A bit more context on dPMR from the European Amateur Radio perspective.
- Correction of my statement that Robust Packet was only implemented in one unit from SCS.

To receive new issues of Zero Retries every week via email, become a free subscriber. To support Zero Retries, paid subscriptions are appreciated, *but entirely optional*.

Subscribe

Zero Retries Boilerplate

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing *Thanks* to:

Tina Stroh KD7WSF for, well, *everything*!

Jack Stroh, Late Night Assistant Editor Emeritus

Shrekky Stroh, Late Night Assistant Editor In training

Annual Founding Members who generously support Zero Retries financially:

Founding Member 0000 - Steven Davidson K3FZT (Renewed 2024)

Founding Member 0001 - Randy Smith WU2S (Renewed 2024)

Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2024)

Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2024)

Founding Member 0004 - William Arcand W1WRA (Renewed 2024)

Founding Member 0006 - Todd Willey KQ4FID (Renewed 2024)

Founding Member 0007 - Merik Karman VK1DF / VK2MKZ (Renewed 2024 *with two Founding Member subscriptions!*)

Founding Member 0008 - Prefers to Remain Anonymous 14 (Renewed 2024)

Founding Member 0009 - Prefers to Remain Anonymous 19 (Renewed 2025)

Founding Member 0011 - Rick Prelinger W6XBE (New 2024)

Founding Member 0012 - Ryan Tolboom N2BP (New 2024)

Founding Member 0013 - Newton White N4EWT (New 2025)

Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

You thousands of readers of Zero Retries without which there would be little point in publishing this newsletter.

Permission for Reuse of Zero Retries Content

Blanket permission is granted for *Amateur Radio use* of any Steve Stroh content in Zero Retries for Amateur Radio newsletters and distribution via Amateur Radio such as (but not limited to) Packet Radio Networks, Packet Radio Bulletin Board Systems, Repeater Nets, etc. Specific blanket permission is granted to TAPR to use any Steve Stroh content in Zero Retries for the TAPR Packet Status Register (PSR) newsletter (I owe them from way back).

In such usage, please provide appropriate authorship credit for the content (especially for guest authors) and mention that it was first published in Zero Retries newsletter, preferably in this format:

This article is reprinted with permission. It was first published in Zero Retries newsletter, issue Zero Retries (number), (date) - (include full web link of the specific issue).

It's appreciated (a courtesy, *but not required*) to notify Zero Retries Editor Steve Stroh N8GNJ of any reuse of Zero Retries content - stevestroh@gmail.com

If you'd like to republish an article in this issue for other uses, just ask.

All excerpts from other authors or organizations, including images, are intended to be [fair use](#). *Unless otherwise noted in the article*, there are no paid promotional items in any Zero Retries articles.

Portions Copyright © 2021, 2022, 2023, 2024, 2025 by Steven K. Stroh.

This issue released on 2025-02-14

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1](#)

I only had to deal with WangNet very peripherally, and I think it died out with the death of Wang Laboratories before it had a chance to transition to TCP/IP.